

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

Claim 1 (currently amended) A vehicle steering column comprising:

an axially extending input shaft for connecting to a vehicle steering wheel, the input shaft being rotatable about an axis upon rotation of the steering wheel;

a housing at least partially enclosing encircling the input shaft, said housing comprising at least two housing parts which are assembled together to define a chamber;

a cylindrical gasket made of resilient material in said chamber and encircling said input shaft, said gasket having a cylindrical inner surface and a ribbed outer surface,

a bearing interposed for location between the housing gasket and the input shaft and for supporting the input shaft for rotation about the axis, the bearing having an inner race engaging engagable with the input shaft and an outer race engagable with said cylindrical inner surface of said gasket;

the housing parts having at least one series of axially spaced, annular ribs that at least partially extend around chamber, around the axis of the input shaft and around the outer race of the bearing, said annular ribs of said housing being engagable with the outer surface of said gasket and press into the resilient material of the gasket to form

the ribbed outer surface when said housing parts are assembled together,

said ribbed outer surface of said gasket being interdigitated with said annular ribs of said housing to resist relative axial movement between said gasket and said housing axially adjacent annular ribs being separated by an annular groove; and

a gasket made of resilient material interposed between the outer race of the bearing and the ribs, the gasket comprising a tubular member encircling the outer race of the bearing, the gasket having a cylindrical inner surface and an outer surface, the inner surface engaging the outer race of the bearing, and the outer surface engaging the ribs, the gasket having portions interdigitated with the ribs to resist relative axial movement between the gasket and the housing,

said axially adjacent annular ribs and said portions of the resilient material of said gasket interdigitated with said axially adjacent annular ribs comprising means for preventing said gasket from walk out from said housing.

Claims 2-8 (canceled)

Claim 9 (original) The vehicle steering column of claim 1 further being defined by:

the housing having two series of ribs, the two series being axially separated by a smooth annular surface;

a bearing being interposed between the input shaft and each series of ribs in the housing; and

a gasket being interposed between the respective bearing and the series of ribs.

Claims 10-12 (canceled)

Claim 13 (previously added) The vehicle steering column of claim 1 wherein the bearing is secured against axial movement relative to the input shaft.

Claim 14 (canceled)

Claim 15 (previously presented) The vehicle steering column according to claim 1, further comprising:

a lower steering column member connected to the input shaft via a universal joint, the lower steering column member being for connecting to steerable wheels of a vehicle; and

the housing including a flange portion for connecting to the lower steering column member, the input shaft tilting relative to the lower steering column member via the housing about another axis upon tilting the steering wheel.

Claims 16-26 (canceled)

Claim 27 (previously presented) A vehicle steering column comprising:

an axially extending input shaft for connecting to a vehicle steering wheel, the input shaft being rotatable about an axis upon rotation of the steering wheel;

a housing at least partially enclosing the input shaft;

a bearing interposed between the housing and the input shaft and supporting the input shaft for rotation about the axis, the bearing having an inner race engaging the input shaft and an outer race;

the housing having at least one series of axially spaced, annular ribs that at least partially extend around the axis of the input shaft and around the outer race of the bearing, axially adjacent annular ribs being separated by an annular groove; and

a gasket made of resilient material interposed between the outer race of the bearing and the ribs, the gasket comprising a tubular member encircling the outer race of the bearing, the gasket having a cylindrical inner surface and an outer surface, the inner surface engaging the outer race of the bearing, and the outer surface engaging the ribs, the gasket having portions interdigitated with the ribs to resist relative axial movement between the gasket and the housing,

said axially adjacent annular ribs and said portions of the resilient material of said gasket interdigitated with said axially adjacent annular ribs comprising means for preventing said gasket from walk out from said housing,

each rib in the series of ribs having a uniform width and each rib in the series of ribs having a width in the range of 0.068 inches to 0.078 inches.

Claim 28 (previously presented) A vehicle steering column comprising:

an axially extending input shaft for connecting to a vehicle steering wheel, the input shaft being rotatable about an axis upon rotation of the steering wheel;

a housing at least partially enclosing the input shaft;

a bearing interposed between the housing and the input shaft and supporting the input shaft for rotation about the axis, the bearing having an inner race engaging the input shaft and an outer race;

the housing having at least one series of axially spaced, annular ribs that at least partially extend around the axis of the input shaft and around the outer race of the bearing, axially adjacent annular ribs being separated by an annular groove; and

a gasket made of resilient material interposed between the outer race of the bearing and the ribs, the gasket comprising a tubular member encircling the outer race of the bearing, the gasket having a cylindrical inner surface and an outer surface, the inner surface engaging the outer race of the bearing, and the outer surface engaging the ribs, the gasket having portions interdigitated with the ribs to resist relative axial movement between the gasket and the housing,

said axially adjacent annular ribs and said portions of the resilient material of said gasket interdigitated with said axially adjacent annular ribs comprising means for preventing said gasket from walk out from said housing,

    each rib in the series of ribs having a uniform height, each rib in the series of ribs having a height in the range of 0.025 inches to 0.035 inches.

Claim 29 (previously presented) A vehicle steering column comprising:

    an axially extending input shaft for connecting to a vehicle steering wheel, the input shaft being rotatable about an axis upon rotation of the steering wheel;

    a housing at least partially enclosing the input shaft;

    a bearing interposed between the housing and the input shaft and supporting the input shaft for rotation about the axis, the bearing having an inner race engaging the input shaft and an outer race;

    the housing having at least one series of axially spaced, annular ribs that at least partially extend around the axis of the input shaft and around the outer race of the bearing, axially adjacent annular ribs being separated by an annular groove; and

    a gasket made of resilient material interposed between the outer race of the bearing and the ribs, the gasket comprising a tubular member encircling the outer race of the bearing, the gasket having a cylindrical inner surface and an

outer surface, the inner surface engaging the outer race of the bearing, and the outer surface engaging the ribs, the gasket having portions interdigitated with the ribs to resist relative axial movement between the gasket and the housing,

    said axially adjacent annular ribs and said portions of the resilient material of said gasket interdigitated with said axially adjacent annular ribs comprising means for preventing said gasket from walk out from said housing,

    each rib having a peak, each peak being flat and having an axial length in the range of 0.012 to 0.022 inches.

Claim 30 (previously presented) A vehicle steering column comprising:

    an axially extending input shaft for connecting to a vehicle steering wheel, the input shaft being rotatable about an axis upon rotation of the steering wheel;

    a housing at least partially enclosing the input shaft;

    a bearing interposed between the housing and the input shaft and supporting the input shaft for rotation about the axis, the bearing having an inner race engaging the input shaft and an outer race;

    the housing having at least one series of axially spaced, annular ribs that at least partially extend around the axis of the input shaft and around the outer race of the bearing, axially adjacent annular ribs being separated by an annular groove; and

a gasket made of resilient material interposed between the outer race of the bearing and the ribs, the gasket comprising a tubular member encircling the outer race of the bearing, the gasket having a cylindrical inner surface and an outer surface, the inner surface engaging the outer race of the bearing, and the outer surface engaging the ribs, the gasket having portions interdigitated with the ribs to resist relative axial movement between the gasket and the housing,

said axially adjacent annular ribs and said portions of the resilient material of said gasket interdigitated with said axially adjacent annular ribs comprising means for preventing said gasket from walk out from said housing,

each annular groove having a valley, the valley being flat and forming a bottom surface of a cavity, the valley having an axial length in the range of 0.012 to 0.022 inches.

Claim 31 (previously presented) A vehicle steering column comprising:

an axially extending input shaft for connecting to a vehicle steering wheel, the input shaft being rotatable about an axis upon rotation of the steering wheel;

a housing at least partially enclosing the input shaft;

a bearing interposed between the housing and the input shaft and supporting the input shaft for rotation about the axis, the bearing having an inner race engaging the input shaft and an outer race;

the housing having at least one series of axially spaced, annular ribs that at least partially extend around the axis of the input shaft and around the outer race of the bearing, axially adjacent annular ribs being separated by an annular groove; and

a gasket made of resilient material interposed between the outer race of the bearing and the ribs, the gasket comprising a tubular member encircling the outer race of the bearing, the gasket having a cylindrical inner surface and an outer surface, the inner surface engaging the outer race of the bearing, and the outer surface engaging the ribs, the gasket having portions interdigitated with the ribs to resist relative axial movement between the gasket and the housing,

said axially adjacent annular ribs and said portions of the resilient material of said gasket interdigitated with said axially adjacent annular ribs comprising means for preventing said gasket from walk out from said housing,

each rib of the series of ribs having side surfaces that extend from the bottom surface at an angle of approximately 57 degrees.

Claim 32 (previously presented) A vehicle steering column comprising:

an axially extending steering input shaft for connecting to a vehicle steering wheel, the input shaft being rotatable about an axis upon rotation of the steering wheel;

a housing having a cylindrical portion at least partially enclosing the input shaft and having inner and outer

surfaces and first and second axially spaced apart ring shaped cavities that extend radially into the inner surface of the cylindrical portion of the housing, the first and second ring shaped cavities being spaced apart by a ring shaped projection of said cylindrical portion of the housing;

first and second bearings interposed between the housing and the input shaft in the first and second cavities, respectively, and supporting the input shaft for rotation about the axis, each of the first and second bearings having an inner race engaging the input shaft and an outer race;

each of the first and second cavities having a series of annular ribs that at least partially extend around the axis of the input shaft and around the outer race of the bearing in the respective first and second cavities, axially adjacent annular ribs being separated by an annular groove; and

first and second gaskets made of resilient material in each of the first and second cavities and interposed between the outer race of the bearing and the ribs, each of the first and second gaskets comprising a tubular member encircling the outer race of the bearing, the resilient material of each of the gaskets having a cylindrical inner surface and an outer surface, the cylindrical inner surface of the resilient material of each gasket engaging the outer race of the bearing, and the outer surface of the resilient material of each gasket engaging the ribs, the resilient material of each gasket having portions interdigitated with the ribs of each of the first and second cavities to resist

relative axial movement between the resilient material of each respective gasket and the housing,

    said axially adjacent annular ribs and said portions of the resilient material of each gasket interdigitated with said axially adjacent annular ribs comprising means for preventing said first and second gaskets from walk out from said first and second cavities,

    each rib in the series of ribs having a uniform width, each rib in the series of ribs having a width in the range of 0.068 inches to 0.078 inches.

Claim 33 (previously presented)     A vehicle steering column comprising:

    an axially extending steering input shaft for connecting to a vehicle steering wheel, the input shaft being rotatable about an axis upon rotation of the steering wheel;

    a housing having a cylindrical portion at least partially enclosing the input shaft and having inner and outer surfaces and first and second axially spaced apart ring shaped cavities that extend radially into the inner surface of the cylindrical portion of the housing, the first and second ring shaped cavities being spaced apart by a ring shaped projection of said cylindrical portion of the housing;

    first and second bearings interposed between the housing and the input shaft in the first and second cavities, respectively, and supporting the input shaft for rotation about the axis, each of the first and second bearings having an inner race engaging the input shaft and an outer race;

each of the first and second cavities having a series of annular ribs that at least partially extend around the axis of the input shaft and around the outer race of the bearing in the respective first and second cavities, axially adjacent annular ribs being separated by an annular groove; and

first and second gaskets made of resilient material in each of the first and second cavities and interposed between the outer race of the bearing and the ribs, each of the first and second gaskets comprising a tubular member encircling the outer race of the bearing, the resilient material of each of the gaskets having a cylindrical inner surface and an outer surface, the cylindrical inner surface of the resilient material of each gasket engaging the outer race of the bearing, and the outer surface of the resilient material of each gasket engaging the ribs, the resilient material of each gasket having portions interdigitated with the ribs of each of the first and second cavities to resist relative axial movement between the resilient material of each respective gasket and the housing,

said axially adjacent annular ribs and said portions of the resilient material of each gasket interdigitated with said axially adjacent annular ribs comprising means for preventing said first and second gaskets from walk out from said first and second cavities,

each rib in the series of ribs having a uniform height, each rib in the series of ribs having a height in the range of 0.025 inches to 0.035 inches.

Claim 34 (previously presented) A vehicle steering column comprising:

an axially extending steering input shaft for connecting to a vehicle steering wheel, the input shaft being rotatable about an axis upon rotation of the steering wheel;

a housing having a cylindrical portion at least partially enclosing the input shaft and having inner and outer surfaces and first and second axially spaced apart ring shaped cavities that extend radially into the inner surface of the cylindrical portion of the housing, the first and second ring shaped cavities being spaced apart by a ring shaped projection of said cylindrical portion of the housing;

first and second bearings interposed between the housing and the input shaft in the first and second cavities, respectively, and supporting the input shaft for rotation about the axis, each of the first and second bearings having an inner race engaging the input shaft and an outer race;

each of the first and second cavities having a series of annular ribs that at least partially extend around the axis of the input shaft and around the outer race of the bearing in the respective first and second cavities, axially adjacent annular ribs being separated by an annular groove; and

first and second gaskets made of resilient material in each of the first and second cavities and interposed between the outer race of the bearing and the ribs, each of the first and second gaskets comprising a tubular member encircling the outer race of the bearing, the resilient

material of each of the gaskets having a cylindrical inner surface and an outer surface, the cylindrical inner surface of the resilient material of each gasket engaging the outer race of the bearing, and the outer surface of the resilient material of each gasket engaging the ribs, the resilient material of each gasket having portions interdigitated with the ribs of each of the first and second cavities to resist relative axial movement between the resilient material of each respective gasket and the housing,

    said axially adjacent annular ribs and said portions of the resilient material of each gasket interdigitated with said axially adjacent annular ribs comprising means for preventing said first and second gaskets from walk out from said first and second cavities,

    each rib having a peak, each peak being flat and having an axial length in the range of 0.012 to 0.022 inches.

Claim 35 (previously presented)     A vehicle steering column comprising:

    an axially extending steering input shaft for connecting to a vehicle steering wheel, the input shaft being rotatable about an axis upon rotation of the steering wheel;

    a housing having a cylindrical portion at least partially enclosing the input shaft and having inner and outer surfaces and first and second axially spaced apart ring shaped cavities that extend radially into the inner surface of the cylindrical portion of the housing, the first and second ring

shaped cavities being spaced apart by a ring shaped projection of said cylindrical portion of the housing;

first and second bearings interposed between the housing and the input shaft in the first and second cavities, respectively, and supporting the input shaft for rotation about the axis, each of the first and second bearings having an inner race engaging the input shaft and an outer race;

each of the first and second cavities having a series of annular ribs that at least partially extend around the axis of the input shaft and around the outer race of the bearing in the respective first and second cavities, axially adjacent annular ribs being separated by an annular groove; and

first and second gaskets made of resilient material in each of the first and second cavities and interposed between the outer race of the bearing and the ribs, each of the first and second gaskets comprising a tubular member encircling the outer race of the bearing, the resilient material of each of the gaskets having a cylindrical inner surface and an outer surface, the cylindrical inner surface of the resilient material of each gasket engaging the outer race of the bearing, and the outer surface of the resilient material of each gasket engaging the ribs, the resilient material of each gasket having portions interdigitated with the ribs of each of the first and second cavities to resist relative axial movement between the resilient material of each respective gasket and the housing,

said axially adjacent annular ribs and said portions of the resilient material of each gasket interdigitated with said axially adjacent annular ribs comprising means for preventing said first and second gaskets from walk out from said first and second cavities,

each annular groove having a valley, the valley being flat and forming a bottom surface of a cavity, the valley having an axial length in the range of 0.012 to 0.022 inches.

Claim 36 (previously presented) A vehicle steering column comprising:

an axially extending steering input shaft for connecting to a vehicle steering wheel, the input shaft being rotatable about an axis upon rotation of the steering wheel;

a housing having a cylindrical portion at least partially enclosing the input shaft and having inner and outer surfaces and first and second axially spaced apart ring shaped cavities that extend radially into the inner surface of the cylindrical portion of the housing, the first and second ring shaped cavities being spaced apart by a ring shaped projection of said cylindrical portion of the housing;

first and second bearings interposed between the housing and the input shaft in the first and second cavities, respectively, and supporting the input shaft for rotation about the axis, each of the first and second bearings having an inner race engaging the input shaft and an outer race;

each of the first and second cavities having a series of annular ribs that at least partially extend around the axis of the input shaft and around the outer race of the bearing in the respective first and second cavities, axially adjacent annular ribs being separated by an annular groove; and

first and second gaskets made of resilient material in each of the first and second cavities and interposed between the outer race of the bearing and the ribs, each of the first and second gaskets comprising a tubular member encircling the outer race of the bearing, the resilient material of each of the gaskets having a cylindrical inner surface and an outer surface, the cylindrical inner surface of the resilient material of each gasket engaging the outer race of the bearing, and the outer surface of the resilient material of each gasket engaging the ribs, the resilient material of each gasket having portions interdigitated with the ribs of each of the first and second cavities to resist relative axial movement between the resilient material of each respective gasket and the housing,

said axially adjacent annular ribs and said portions of the resilient material of each gasket interdigitated with said axially adjacent annular ribs comprising means for preventing said first and second gaskets from walk out from said first and second cavities,

each rib of the series of ribs having side surfaces that extend from the bottom surface at an angle of approximately 57 degrees.

Claim 37 (previously presented)      A vehicle steering column comprising:

an axially extending steering input shaft for connecting to a vehicle steering wheel, the input shaft being rotatable about an axis upon rotation of the steering wheel;

a housing having a cylindrical portion at least partially enclosing the input shaft and having inner and outer surfaces and first and second axially spaced apart ring shaped cavities that extend radially into the inner surface of the cylindrical portion of the housing, the first and second ring shaped cavities being spaced apart by a ring shaped projection of said cylindrical portion of the housing;

first and second bearings interposed between the housing and the input shaft in the first and second cavities, respectively, and supporting the input shaft for rotation about the axis, each of the first and second bearings having an inner race engaging the input shaft and an outer race;

each of the first and second cavities having a series of annular ribs that at least partially extend around the axis of the input shaft and around the outer race of the bearing in the respective first and second cavities, axially adjacent annular ribs being separated by an annular groove; and

first and second gaskets made of resilient material in each of the first and second cavities and interposed between the outer race of the bearing and the ribs, each of the first and second gaskets comprising a tubular member encircling the outer race of the bearing, the resilient

material of each of the gaskets having a cylindrical inner surface and an outer surface, the cylindrical inner surface of the resilient material of each gasket engaging the outer race of the bearing, and the outer surface of the resilient material of each gasket engaging the ribs, the resilient material of each gasket having portions interdigitated with the ribs of each of the first and second cavities to resist relative axial movement between the resilient material of each respective gasket and the housing,

said axially adjacent annular ribs and said portions of the resilient material of each gasket interdigitated with said axially adjacent annular ribs comprising means for preventing said first and second gaskets from walk out from said first and second cavities,

each rib in the series of ribs has a width and a height, the width being in the range of 0.068 inches to 0.078 inches, the height being in the range of 0.025 inches to 0.035 inches, each rib having a flat peak with an axial length in the range of 0.012 inches to 0.022 inches;

each annular groove having a flat valley with an axial length in the range of 0.012 inches to 0.022 inches; and

each rib of the series of ribs having side surfaces that extend from the bottom surface at an angle of approximately 57 degrees.

Claim 38 (new) A vehicle steering column comprising:

an axially extending input shaft for connecting to a vehicle steering wheel, the input shaft being rotatable about an axis upon rotation of the steering wheel;

a housing at least partially enclosing the input shaft;

a bearing interposed between the housing and the input shaft and supporting the input shaft for rotation about the axis, the bearing having an inner race engaging the input shaft and an outer race;

the housing having at least one series of axially spaced, annular ribs that at least partially extend around the axis of the input shaft and around the outer race of the bearing, axially adjacent annular ribs being separated by an annular groove; and

a gasket made of resilient material interposed between the outer race of the bearing and the ribs, the gasket comprising a tubular member encircling the outer race of the bearing, the gasket having a cylindrical inner surface and an outer surface, the inner surface engaging the outer race of the bearing, and the outer surface engaging the ribs, the gasket having portions interdigitated with the ribs to resist relative axial movement between the gasket and the housing,

said axially adjacent annular ribs and said portions of the resilient material of said gasket interdigitated with said axially adjacent annular ribs comprising means for preventing said gasket from walk out from said housing,

each rib in the series of ribs has a width and a height, the width being in the range of 0.068 inches to 0.078 inches, the height being in the range of 0.025 inches to 0.035 inches, each rib having a flat peak with an axial length in the range of 0.012 inches to 0.022 inches;

each annular groove having a flat valley with an axial length in the range of 0.012 inches to 0.022 inches; and

each rib of the series of ribs having side surfaces that extend from the bottom surface at an angle of approximately 57 degrees.